Bevan, cost him no more than 28*s*. The lithographic landscapes, especially numerous in vol. i., add greatly to the interest of this work. There are two very spirited sketches by Wolf of eagles' nests in Argyllshire, drawn to illustrate the locality previously mentioned, but the majority of these landscapes depict scenes in Lapland rendered more or less famous in connection with Wolley's exploits. The old Lapp altar near Muoniovara, the osprey's nest on the top of a Scotch fir on the Norwegian side of the watershed, and the great crane marsh, all three from original sketches by the editor, are examples of these landscapes. But perhaps the most interesting of all—certainly the most poetic—is the picture of the hooper asleep on her nest on an islet in the Patsjoki, at midnight, June 17–18, 1855; this is based on a faint sketch made by Wolley on the spot, and most skilfully interpreted by Mr. Jury. Again (Table O), there is a truly Lapland scene, where the facile golden-eye is about to deposit an egg in a *tylla*, fastened to a fir-tree, for the benefit of the wily native. A map of the country between the Gulf of Bothnia and the Arctic Ocean is added. Muoniovara occupies a fairly central position, and the district more especially exploited is comprised within the upper basins of the Muonio Elv and the Ounas Joki—a stretch of about 150 miles from S.E. to N.W. There is something very musical in the sound of many of the Finnish place-names. Those more especially associated with the great "finds" may be observed in considerable numbers in the central area of the map, and collectors who possess marked eggs from Lapland cannot fail to be interested in the topography of the district.

It is not easy to give anything like a synoptic view of a work which appears in the form of a catalogue, so that its general character can only be inferred from such extracts as we have ventured to make. There is abundance of oological lore, relating to a period when great discoveries were being made, and this matter has been carefully sifted by an editor whose critical acumen and extensive knowledge are well known. The work, therefore, cannot fail to be a valuable repertory of facts, and we are bound to admit that in the "Ootheca Wolleyana" the veteran ornithologist of Cambridge, whilst adding largely to the store of information originally acquired by Wolley, has raised a worthy monument to the memory of his long-lost friend, and we can only express our deep regret that since its completion Prof. Newton has likewise joined the majority. W. H. H.

INDIAN MALACOLOGY

Land and Freshwater Mollusca of India, &c. By Lieut.-Col. H. H. Godwin-Austen. Supplementary to Messrs. Theobald and Hanley's "Conchologia Indica." Vol. ii., part x. Pp. 147–238; plates ci–cxvii. (London: Taylor and Francis, 1907.)

IT is just nineteen years since the first six parts (1882–1888) of this work were noticed in these pages (NATURE, July 5, 1888, pp. 217–218), and the author is now the sole active survivor of the celebrated band of Indian malacologists that included Theobald, the Nevills, Stoliczka, Benson, Beddome, and the two Blanfords. One by one they have nearly all gone from us (Dr. W. T. Blanford's demise is still fresh in our memories), leaving, alas, no successors in the field of their labours.

This but adds to our hope that Col. Godwin-Austen may long be spared to carry on the work he has begun, but, so wide is the field, can never expect to complete, especially since of late it has been only now and then he has been able to find time for the examination of material that has come to hand. As a consequence, seven years have elapsed since the appearance of the preceding part of the work before us.

The present number is on a line with its predecessors, and like them shows no arrangement of subject, the various notes being presumably placed in the order in which they were written, and consequently deal alternately with the two families Zonitidæ and Endodontidæ, to which alone the materials treated belong.

In the former family we find one new subgenus, Dalingia, and two new genera, Sarika and Staffordia, established; while the author transfers Austenia, Girasia, and Cryptosoma from the Helicarioninæ to the Macrochlamyinæ, and places Leptodontaria and Ibycus in the Durgellinæ. He further digresses advisedly to discuss the anatomy of three Japanese species, which have been referred to Macrochlamys, but which he shows must be removed, one to a new subgenus, Petalochlamys, and the other two to Lamprocystis.

The most interesting and aberrant member of the family is Stoliczka's genus Sophina, concerning which our author has much of interest to say.

To the family Endodontidæ, which is chiefly an Australasian group, three Indian representatives are referred, namely, Thysanota, Philalanka, and Sykesia, and a new subfamily, Thysanotinæ, is created for their reception.

The wonderful similarity of these animals to Corilla (a Ceylon genus) and Plectopylis is dwelt on, but Stoliczka's idea that the latter was related to Clausilia is rejected.

To the Thysanotinæ may also possibly belong the new genus Rahula, to which the *Helix macropleuris*, Benson, with other species, some new, is referred.

Among suggestions as to topographical distribution is the hint that the fauna of the Bhutan Himalayas may possibly be rather related to that of western China than to that of India.

At the same time, the author is inclined to consider the eastern Himalayas as the centre of dispersal of the genus Macrochlamys, and points to the geological evidence as tending to show that from Sikkim eastward up to the margin of the present plains was an old land area probably coeval with that of peninsular India, and once connected with it across what is now the delta of the Ganges. The south-eastern limit of the range of the genus appears to be about Tenasserim.

So far as the Gangetic valley is concerned, there has been a natural transport southward by flood-waters

of the mollusca inhabiting the mountain country, and the molluscan fauna of the great delta of the Ganges and Brahmaputra had its origin in the Himalayan slopes, although they have occupied their present quarters for sufficiently long a period to become specifically distinct. (BV)².

WATER AND THE PUBLIC HEALTH.

(1) *The Value of Pure Water.* By George C. Whipple. Pp. viii+84. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1907.) Price 4*s.* 6*d.* net.

(2) *The Bacteriological Examination of Water Supplies.* By Dr. William G. Savage. Pp. xvi+297. (London: H. K. Lewis, 1906.) Price 6*s.* 6*d.* net.

(1) THIS little book is planned on novel lines and deserves recognition. An extract will best serve to define its scope.

"Given two water sources equally available to a city for purposes of supply, both safe to drink, but one high coloured and soft, the other colourless and hard—which is the better selection? A water-works plant is to be appraised: structurally the system is a good one, but the quality of the water is unsatisfactory because of its excessive colour or turbidity—how much should be deducted from the value of the works because of the bad quality of the water? The water-works owned by a private company are to be purchased by the city; the city has a high typhoid fever death-rate, due unquestionably to the water supply—how much less should the city pay because of that fact? A city is using turbid river water—how much can it afford to pay to filter it? A city is using a water so heavily laden with Anabæna that it is nauseous to drink—how much can the city afford to pay to procure a new supply?"

An attempt is made from available data to establish formulæ which may be employed to calculate the allowable depreciation due to sanitary quality, physical characteristics (colour, odour, &c.), hardness, &c., of a water supply.

The following example is a calculation in the case of typhoid fever. The financial loss to the community for each death from typhoid fever is assumed from various data to be equal to 10,000 dollars. A proportion of the death-rate is due to the disease transmitted by means (shell-fish, flies, &c.) other than water. Assuming that all typhoid in excess of N is due to the water supply, that the daily consumption of water is 100 gallons per capita, and that T is the total typhoid death-rate per 100,000, then (T−N) 10,000=loss to the community in dollars for 365 × 100 × 100,000 gallons of water, or

$$D=\frac{(T-N)1000}{365}=2\cdot75(T-N),$$

where D stands for the loss in dollars per million gallons of water used. The author is quite alive to the fact that local and other conditions must modify his conclusions, and recognises that more data are required before finality is reached in the elaboration of the formulæ. The book is suggestive and stimulating reading, the various tables add to its value, and we heartily commend it to the sanitarian and water engineer.

(2) This book by Dr. Savage, who has made many important contributions to the subject on which he writes, gives an admirable survey of the present position of the bacteriology of water supplies. Successive chapters deal with the bacterial content of waters and the influences affecting it, excreta, sewage, and soil in relation to the bacteriological examination, the characters of the intestinal bacteria, bacterial evidences of pollution, and full details of the methods employed in the bacteriological examination of water. The chapter on the interpretation of results is particularly to be recommended. A full bibliography is appended. The medical officer of health, the analyst, and the bacteriologist will find this book a trustworthy and useful guide. R. T. HEWLETT.

THREE MATHEMATICAL TRACTS.

Quadratic Forms and their Classification by Means of Invariant Factors. By Prof. T. J. I'A. Bromwich, F.R.S. Pp. viii+100. (Cambridge: The University Press, 1906.) Price 3*s.* net.

The Axioms of Projective Geometry. By Dr. A. N. Whitehead, F.R.S. Pp. viii+64. (Cambridge: The University Press, 1906.) Price 2*s.* 6*d.*

The Axioms of Descriptive Geometry. By Dr. A. N. Whitehead, F.R.S. Pp. viii+74. (Cambridge: The University Press, 1907.) Price 2*s.* 6*d.*

THESE are Nos. 3, 4, and 5 of the Cambridge Tracts in Mathematics and Mathematical Physics, which are intended to help students by providing them with brief and readable introductions to mathematical theories which are important in themselves, and yet for various reasons do not appear in the ordinary text-books. If they serve their purpose they will induce their readers to follow up the paths they indicate, and try to explore still further the mazy garden of the mathematical muse.

The present state of the theory of quadratic forms illustrates very well how much interest there may be in the particular cases of a problem which, in its so-called "general form," has a trite and familiar solution. To put the matter into a geometrical shape; when there are four homogeneous variables, let S=0, T=0 be the equations of two quadratic surfaces; then in general the family S+λT=0 will have a common self-conjugate tetrahedron, and by taking this as a tetrahedron of reference, S and T assume a well-known standard form. But there are thirteen other cases to consider, for each of which there is a distinct reduced form of S+λT; for instance, if S and T intersect in a cuspidal quartic, the reduced form is

$$2(\lambda+a)xy+2yz+b(\lambda+a)z^2+c(\lambda+d)t^2.$$

If we consider the small oscillations of a dynamical system with four degrees of freedom, we are confronted by precisely the same analytical problem of reduction; the algebraical classification is the same, but certain cases are ruled out by the condition that